

REMARKS

This is in response to the Office Action of 13 January 2003. Claims 1-12 are pending in the application, and Claims 1-12 have been rejected.

Claim 1 has been amended; Claim 2 has been cancelled; and Claims 13-16 have been added.

No new matter has been added.

In view of the amendments above and remarks below, Applicants respectfully request reconsideration and further examination.

About The Invention

The present invention relates generally to methods of forming vias to conductive lines, and more particularly relates to such methods wherein the conductive lines have conductive capping layers, silicon carbide etch stop layers over and adjacent to the conductive lines and capping layers, and low-k dielectric material disposed over the silicon carbide etch stop layer.

Rejections under 35 USC 102(e)

Claims 1,-5, 9, and 12 have been rejected under 35 USC 102(e) as being anticipated by Avanzino, et al. (6,593,632).

Claim 2 has been cancelled, thereby rendering the rejection thereof under 35 USC 102(e) moot.

Independent Claim 1 has been amended to recite the limitation of (now cancelled) Claim 2, which makes clear that the etch stop layer is applied to the top portion and the sidewall portions of the conductor.

Avanzino, et al., do not to disclose, suggest, or provide motivation for the invention defined by amended Claim 1. The disclosure of Avanzino, et al., does not

disclose applying the etch stop layer to the conductor sidewalls. Rather, Avanzino, et al. disclose that the etch stop layer is separated from the conductor sidewalls by a sidewall spacer (Fig. 1, element 20; and column 4, lines 10-12). For at least this reason, Applicants respectfully submit that the rejection of Claim 1 under 35 USC 102(e) has been overcome. Similarly, Applicants submit that the rejections of Claims 3-5, 9 and 12, which depend directly or indirectly from amended Claim 1, have also been overcome.

Applicants further respectfully submit, that the inventions defined by Applicants' amended Claims are not suggested or motivated by the disclosure of Avanzino, et al.

Rejections under 35 USC 103(a)

Claims 7-8 and 10 have been rejected under 35 USC 103(a), as being unpatentable over Avanzino, et al., in view of Boeck, et al., (US Patent 5,880,018), although the Examiner actually appears to be referring to Dabbaugh, et al. (US Patent 6,362,094) in the discussion of the rejection.

Claims 6 and 11 have been rejected under 35 USC 103(a), as being unpatentable over Avanzino, et al., in view of Ngo, et al., (US Patent 6,190,966).

As described above, independent Claim 1 has been amended, and Claims 6-8 and 10-11 depend, directly or indirectly, therefrom.

Applicants respectfully refer to the arguments presented above in connection with the amendments to independent Claim 1. Additionally, the references cited by the Examiner do not disclose, suggest, or provide motivation for the methods defined by Applicants' Claims.

For example, although the Examiner states that Dabbaugh, et al., disclose a capping layer and that Boeck, et al. disclose a titanium nitride barrier layer, neither of these references produce Applicants' claimed method. The barrier layer of Boeck, et al., may be comprised of titanium nitride but it is formed in the via opening, which is

different from Applicants' claimed method in which the capping layer is clearly formed prior to the via opening, prior to the dielectric layer deposition, and prior even to the formation of the etch stop layer (since it is claimed that the etch stop layer applied to the top surface of the conductor, which in Claim 1 includes the capping layer). This is a substantial difference in method, and the cited references do not provide the teaching thereof.

With respect to the Examiner's citation of Ngo, et al., Applicants respectfully assert that this reference does not disclose Applicant's claimed method because the etch stop layer (20) is not applied to the conductor sidewalls as claimed in amended Claim 1, but rather etch stop layer (20) is separated from the conductor by sidewall spacers (14g). Ngo, et al., do not appear to suggest or provide motivation for Applicant's claimed method.

Applicants respectfully submit that at least in view of the arguments above, and the amendments to independent Claim 1, the rejections under 35 USC 103(a) of dependent Claims 6-8 and 10-11 have been overcome.

New Claims 13-16

New Claims 13-16 are directed generally to methods of forming electrically conductive pathways including forming vias to conductive lines having conductive capping layers, and the use of etch stop layers.

The cited references do not appear to disclose or suggest the invention defined by new Claims 13-16. In particular, the references do not appear to teach the formation, on a substrate, of a patterned conductor having a capping layer disposed of a top surface thereof, an etch stop layer disposed on the top surface of the capping layer and the sidewalls of the capping layer and the sidewalls of the conductor, forming a via opening that exposes a portion of the etch stop layer, etching the exposed etch stop layer while leaving the sidewalls of the capping layers and the sidewalls of the conductor covered by the etch stop layer, and filling the via opening with conductive material. The Claims also variously recite that the capping

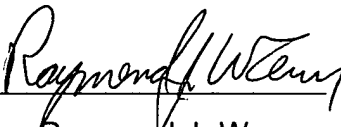
layer is electrically conductive, the etch stop layer comprises silicon carbide, and the via opening may be unlanded. Support for these Claims may be found generally throughout the specification, and can more particularly be found at pages 4-6; and in Figs. 1-4.

Conclusion

All of the objections and rejections in the outstanding Office Action of 13 January 2004 have been responded to, and Applicants respectfully submit that the pending Claims 1 and 3-16 are now in condition for allowance.

Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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